WHAT IS CLAIMED IS:

1. A digital image processing method for detecting human irises in a digital image, comprising the steps of:

measuring the red intensity of the pixels in the image;

determining the probability that each pixel is an iris based upon the red intensity of the pixel;

determining the probability that each pixel is not an iris based upon the red intensity of the pixel; and

determining whether each pixel is an iris by analyzing the relationship between the probability that the pixel is an iris and probability that the pixel is not an iris.

2. The method of claim 1, wherein the step of determining whether each pixel is an iris is based upon the application of a Bayes model to the probability that the pixel is an iris, the probability that a pixel is not an iris, the probability of the occurrence of a non-iris pixel in the image and the probability of the occurrence of a non-iris pixel in the image.

3. The method of claim 1 further comprising the step of detecting skin color regions in the image and wherein the step of measuring the red intensity comprises measuring the red intensity of only the pixels in the skin color region.

4. The method of claim 3 further comprising the step of performing color equalization on the image prior to the step of detecting skin color regions in the image.

5. The method of claim 4 wherein the step of determining whether each pixel is an iris is based upon the application of a Bayes model to the probability that the pixel is an iris, the probability that the pixel is not an iris, the probability of the occurrence of an iris in a skin color region, and the probability of the occurrence of a non-iris pixel in a skin color region.

6. The method of claim 1 further comprising the step of finding oval shaped skin colored regions in the image and wherein the step of measuring the red intensity of the pixels in the image comprises measuring only those pixels within an oval shaped skin colored region.

7. The method of claim 6 wherein the step of determining whether each pixel is an iris is based upon the application of a Bayes model to the probability that the pixel is an iris, the probability that the pixel is not an iris, the probability of the occurrence of an iris in a skin color region, and the probability of the occurrence of a non-iris pixel in a skin color region.

8. The method of claim 4 further comprising the step of finding oval shaped skin colored regions in the image and wherein the step of measuring the red intensity of the pixels in the skin color region comprises measuring only those pixel within an oval shaped skin color region.

9. The method of claim 8 wherein the step of determining whether each pixel is an iris is based upon the application of a Bayes model to the probability that the pixel is an iris, the probability that the pixel is not an iris, the probability of the occurrence of an iris in a skin color region, and the probability of the occurrence of a non-iris pixel in a skin color region.

10. A method for detecting human irises and eyes in a digital image comprising the steps of:

finding a skin color region;

detecting iris color pixels in the skin colored region using a Bayes model; and

locating eye positions based upon the detected iris color pixels.

11. The method of claim 10, wherein the step of locating eye positions based upon the detected iris color pixels comprises the steps of:

clustering iris color pixels;

finding the center of each cluster;

dividing the skin colored region into a left-half and a right-half;

locating the most likely left eye position in the left-half region using the summation of squared difference method; and

locating the most likely right eye position in the right-half region using the summation of squared difference method.

12. The method of claim 11, wherein the step of locating the most likely left eye position using the summation of squared difference method comprises the steps of:

defining a window of pixels surrounding the center of each of the clusters in the image;

dividing the iris pixel clusters into left-half pixel clusters and right-half pixel clusters; and

locating the most likely left eye position based on the summation of squared difference between an average eye and patch of the image centered at each of the pixels in each of the windows surrounding a left-half iris pixel cluster.

13. The method of claim 11, wherein the step of locating the most likely right eye position using the summation of squared difference method comprises the steps of:

defining a window of pixels surrounding the center of each of the clusters in the image;

dividing the iris pixel clusters into left-half iris pixel clusters and right-half pixel clusters; and

locating the most likely right eye position based on the summation of squared difference between an average eye and patches of the image centered at each of the pixels in each of the windows surrounding a right-half iris pixel cluster.

14. The method of claim 10 wherein the step of detecting iris color pixels using a Bayes model comprises measuring the red intensity of the pixels in the skin color region;

determining the probability that each pixel is an iris based upon the red intensity of the pixel;

determining the probability that each pixel is not an iris based upon the red intensity of the pixel; and

applying a Bayes model to the probability that the pixel is an iris, the probability that the pixel is not an iris, the probability of the occurrence of an iris in the skin colored region and probability of the occurrence of a non-iris pixel in the skin colored region.

15. A computer program product for detecting human irises in a digital image, the computer program product comprising a computer readable storage medium having a computer program stored thereon for performing the steps of:

measuring the red intensity of the pixels in the image;

determining the probability that each pixel is an iris based upon the red intensity of the pixel;

determining the probability that each pixel is not an iris based upon the red intensity of the pixel; and

determining whether each pixel is an iris by analyzing the relationship between the probability that the pixel is an iris and probability that the pixel is not an iris.

16. The computer program product of claim 15 wherein the step of determining whether each pixel is an iris is based upon the application of a Bayes model to the probability that the pixel is not an iris, the probability of the occurrence of an iris in the image, and the probability of the occurrence of a non-iris pixel in the image.

17. The computer program product of claim 15 further comprising the step of detecting skin color regions in the image and wherein the step of measuring the red intensity comprises measuring the red intensity of only the pixels in the skin color region.

18. The computer program product of claim 15, further comprising the step of performing color histogram equalization on the image prior to performing the step of detecting skin color regions in the image.

19. The computer program product of claim 18 wherein said computer program product performs the step of determining whether the pixel is an iris is based upon the application of a Bayes model to the probability that the pixel is an iris, the probability that the pixel is not an iris, the probability of the occurrence of an iris in the skin color region and probability of the occurrence of a non-iris pixel in the skin color region.

20. The computer program product of claim 15, further comprising the step of finding oval shaped skin colored regions in the image and wherein the step of measuring the red intensity of the pixels in the image comprises measuring only those pixels within an oval shaped skin colored region.

21. The computer program product of claim 20 wherein said computer program product performs the step of determining whether the pixel is an iris is based upon the application of a Bayes model to the probability that the pixel is an iris, the probability that the pixel is not an iris, the probability of the occurrence of an iris in the skin color region and probability of the occurrence of a non-iris pixel in the skin color region

22. The computer program product of claim 18, further comprising the step of finding oval shaped skin colored regions in the image and wherein the step of measuring the red intensity of the pixels in the image comprises measuring only those pixels within an oval shaped skin colored region.

23. The computer program product of claim 22 wherein the step of determining whether the pixel is an iris is based upon the application of a Bayes model to the probability that the pixel is an iris, the probability that the pixel is not an iris, the probability of the occurrence of an iris in a skin color region, and the probability of the occurrence of a non-iris pixel in a skin colored region.

24. A computer program product for detecting human irises and eyes in a digital image, the computer program product comprising a computer readable storage medium having a computer program stored thereon for performing the steps of:

finding a skin colored region;

detecting iris color pixels in the skin colored region using a Bayes model; and

locating eye positions based upon the detected iris color pixels.

25. The computer program product of claim 24, wherein the step of locating eye positions based upon the detected iris color pixels comprises the steps of:

clustering iris color pixels;

finding the center of each cluster;

dividing the skin colored region into a left-half and a right-half;

locating the most likely left eye position in the left-half region using the summation of squared difference method; and

locating the most likely right eye position in the right-half region using the summation of squared difference method.

26. The computer program product of claim 25, wherein the step of locating the most likely left eye position is performed using the summation of squared difference method comprises the steps of:

defining a window of pixels surrounding the center of each of the clusters in the image;

dividing the iris pixel clusters into left-half iris pixel clusters and right-half pixel clusters; and

locating the most likely left eye position based on the summation of squared difference between an average eye and patch of the image centered at each of the pixels in each of the windows surrounding a left-half iris pixel cluster.

27. The computer program product of claim 26, wherein the step of locating the most likely right eye position is performed using the summation of squared difference method comprises the steps of:

defining a window of pixels surrounding the center of each of the iris pixel clusters in the image;

dividing the iris pixel clusters into left-half iris pixel clusters and right-half pixel clusters; and

locating the most likely right eye position based on the summation of squared difference between an average eye and patches of the image centered at each of the pixels in each of the windows surrounding a right-half iris pixel cluster.

28. The computer program product of claims 25 wherein the step of detecting iris color pixels using a Bayes model comprises measuring the red intensity of the pixels in the skin color region;

determining the probability that each pixel is an iris based upon the red intensity of the pixel;

determining the probability that each pixel is not an iris based upon the red intensity of the pixel; and

applying the Bayes model to the probability that the pixel is an iris, the probability that the pixel is not an iris, the probability of the occurrence of an iris in the skin colored region and probability of the occurrence of a non-iris pixel in the skin colored region.